

Title: Resistor Color Codes and Values for Practical Application

Brief Overview:

This lesson deals with the application and use of resistor color codes to solve mathematical valuations of standard electronic appliances throughout the home. Students will be involved in measuring and recognizing the codes, values, and application of resistors in their everyday lives.

Links to NCTM 2000 Standards:

- **Mathematics as Problem Solving**

Students will apply mathematical application to the solving of resistance values, and how they will be used to solve problems in electronic circuitry.

- **Mathematics as Reasoning and Proof**

Students will demonstrate their ability to reason and apply values to given problems and solving for the situation. They will be required to make conjectures, gather evidence, and build arguments to support their findings.

- **Mathematics as Communication**

Students will demonstrate their ability to communicate the necessary mathematical skills needed to solve the given problem. They also will be required to work in groups to solve these problems.

- **Mathematics as Representation**

Students will be able to represent the problem through various media and in an appropriate format. They will create several possible formats for solving.

- **Number and Operation**

Students will recognize and understand ways of representing numbers.

- **Patterns, Functions, and Algebra**

Students will use symbolic forms and patterns to represent numbers.

- **Measurement**

Students will apply measuring skills through the use of technology related equipment.

Grade/Level:

Grades 8 -10

Duration/Length:

Time required will be 2 -3 days. Students will be introduced to resistor color codes and their applications and then will be introduced to the technical equipment necessary to verify their findings.

Prerequisite Knowledge:

Students should have working knowledge of the following skills:

- Estimating, rounding, and place value

Student Outcomes:

Students will be able to:

- recognize the need to use codes as representation of numerical systems.
- measure resistor values using VOM meters.
- solve color codes using the color chart.
- brainstorm within a group.
- apply mathematical concepts to real world applications.

Materials/Resources/Printed Materials:

- Worksheets
- Resistors
- VOM Meters (voltmeters)

Development/Procedures:

Begin class by introducing the function and uses of resistors. Explain size constraints of resistors and need to value each. Assign students to teams to brainstorm possible methods of identifying resistor values directly on the unit. Emphasize the small size of the resistors. Suggest that students consider alternate methods such as symbols, colors, lines, etc. Challenge students to solve a problem in a logical and functional manner.

Introduce the resistor color code chart and explain its usage. Demonstrate several examples of solving values using the color chart. Require students to complete the practice sheet of resistor codes (Worksheet #1). Emphasize that resistor color codes are a universal language and can be understood by people from other countries and cultures.

Introduce the voltmeter and its application in the measurement of resistors and resistor circuits. Demonstrate the use of the voltmeter, prior to students attempting to use this apparatus.

Assessment:

Teachers will assess the progress of students through the successful completion of the worksheet. Students will be visually assessed by the teacher as he/she works his/her way around the room, while they are measuring the actual resistors using both the color code chart and the voltmeters.

Extension/Follow Up:

- Review how resistors are used in electronic hardware, i.e., computers, stereos, etc.
- Students will be able to apply advanced meter techniques to measuring resistance in circuits utilizing the information they have used.

Authors:

James Groves
Washington County Vocational
Washington County, Maryland

Jeremy Kurutz
Overlea High School
Baltimore County, Maryland

Solve for each set of resistor colors.

1. Red, blue, green _____
2. Red, red, black _____
3. Green, red, brown _____
4. Violet, orange, orange _____
5. Blue, black, black _____
6. Red, green, green _____
7. Gray, violet, red _____
8. Yellow, brown, yellow _____
9. Orange, red, red _____
10. Orange, orange, orange _____
11. Brown, white, black _____
12. Green, white, red _____
13. Orange, red, brown _____
14. Violet, violet, red _____
15. Red, white, blue _____

Worksheet #1 Answer Key

Solve for each set of resistor colors.

1. Red, blue, green	2600000
2. Red, red, black	22
3. Green, red, brown	520
4. Violet, orange, orange	73000
5. Blue, black, black	60
6. Red, green, green	2500000
7. Gray, violet, red	8700
8. Yellow, brown, yellow	410000
9. Orange, red, red	3200
10. Orange, orange, orange	33000
11. Brown, white, black	19
12. Green, white, red	5900
13. Orange, red, brown	320
14. Violet, violet, red	7700
15. Red, white, blue	29000000

Resistor Value Color Code

Color	First Band	Second Band	Third Band
black	0	0	x1
brown	1	1	x10
red	2	2	x100
orange	3	3	x1000
yellow	4	4	x10000
green	5	5	x100000
blue	6	6	x1000000
violet	7	7	x10000000
gray	8	8	x100000000
white	9	9	x1000000000